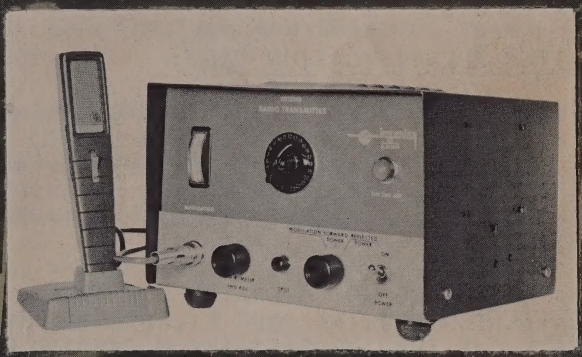
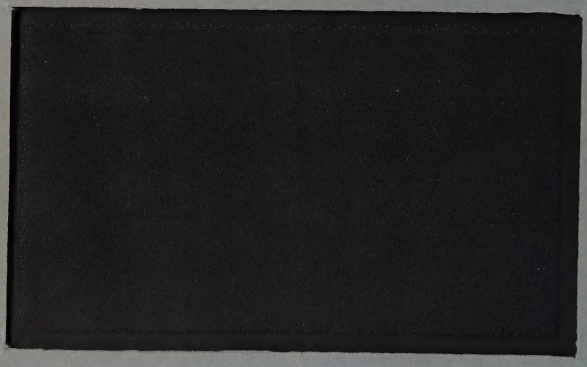
OPERATING AND SERVICE INSTRUCTIONS



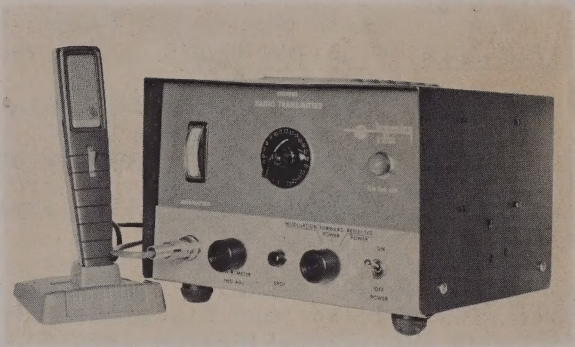
BROWNING LABORATORIES, INC. LACONIA, N. H.



OPERATING AND SERVICE INSTRUCTIONS

BROWNING 23/S-NINE

Citizen Radio Transmitter



To be assured of maximum satisfaction with this high quality Deluxe Transmitter, please read this manual with care. It pays to know your equipment.

BROWNING LABORATORIES, INC.

100 Union Avenue Laconia, N. H.

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TRANSMITTER IDENTIFICATION CARD

Each transmitter is supplied with an identification card FCC form 542-C. Fill in this card with the appropriate information and place it in the card holder on the right side of the transmitter.

WARNING: DO NOT OPERATE YOUR TRANSMITTER UNTIL YOU RECEIVE YOUR LICENSE AND PROPERLY FILL OUT THE IDENTIFICATION CARD.

OPERATING AND SERVICE INSTRUCTIONS

BROWNING 23/S-NINE

Citizens Deluxe Transmitter

GENERAL INFORMATION

Your Browning 23/S-NINE Transmitter represents the ultimate in citizens radio transmitters and coupled with the Browning R-2700, you have the finest base station equipment available. Browning equipment is well designed, dependable and ruggedly built. Although it will withstand considerable abuse, it should be accorded the treatment given any fine electronic equipment.

Some of the features which make this transmitter the finest available are:

1. 23 switch selected transmitting channels
2. Relative power output and Standing Wave Indicator
3. Push to talk microphone
4. Efficient Pi network output
5. Front panel modulation meter
6. Spotting switch
7. Speech clipper and filter to provide high average percent modulation without splatter on adjacent channels
8. Modern silicon rectifier power supply

INSTALLATION

CONNECTING THE 23/S-NINE TO THE R-2700
(Refer to Fig. 1)

If your transmitter was purchased for use with the R-2700 receiver you will find two interconnecting cables packed with the transmitter. One cable has an octal plug on both ends, this cable will be referred to as the "control cable". The other cable has a small RF connector on one end and a large RF connector on the other end, this cable will be referred to as the "RF cable".

Connect the control cable to the transmitter by inserting one end in the control socket on the rear of the chassis. The key on the octal plug must mate with the keyway in the large center hole of the socket. Do Not Force - be sure the key and the keyway are mated. Connect the other end of the control cable to the control socket of the R-2700 in the same manner. Both ends of the cable are the same so there is no danger of installing this cable incorrectly.

Connect the small connector end of the RF cable to the small socket on the transmitter. Connect the large connector on the other end of the RF cable to the R-2700 antenna socket.

Connect your antenna to the large socket on the transmitter marked "ANT". NEVER ATTEMPT TO OPERATE THE TRANSMITTER WITHOUT PROPER CONNECTION TO AN ANTENNA OR A DUMMY LOAD.

Now insert the power cords of both the receiver and transmitter into a wall socket. Place the microphone in its stand and locate it in front of the equipment. Your base station is now ready for operation.

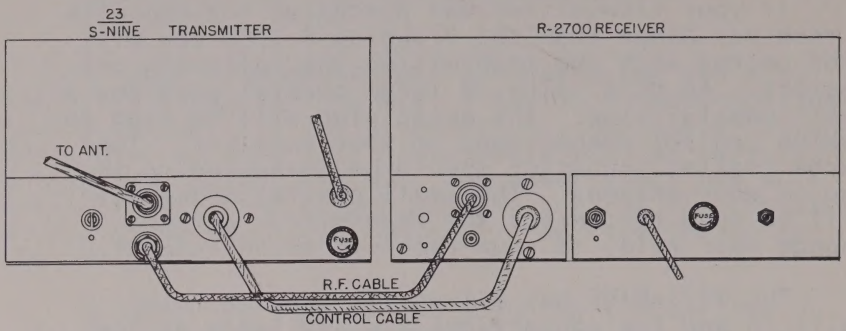
CONNECTING THE 23/S-NINE TO ANY COMMUNICATIONS RECEIVER (Refer to Fig. 2)

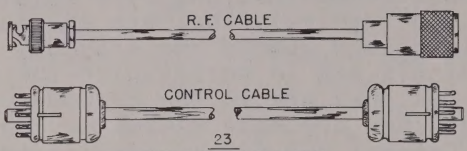
If your transmitter was purchased for use with a receiver other than the Browning R-2700 you will find packed with the transmitter the following connectors: An octal plug, a large coaxial plug and a small coaxial plug. The octal plug will be used for making control connections to your receiver. The large coaxial connector should be connected to the end of your antenna. The small coaxial connector will be used to connect the transmitter antenna change over relay to your receiver antenna input.

The 23/S-NINE has a transmit-receive relay built in and the connections are available at the control socket. Most communications type receivers are equipped with two terminals that are shorted together for receiving and opened for standby. Usually these terminals are in series with the B supply, but sometimes they are in the cathode circuit. In any event they are most always on the rear of the receiver. Connect two wires, one to each of these terminals, connect the other ends of these wires to pins 4 and 5 of the octal plug. Be sure to slip the octal cover on to the wires before soldering the wires in place. Pins 4 and 5 are shorted together when the transmitter is off and opened when the transmitter is on the air so that if properly connected to your receiver, the transmitter will turn off your receiver when it is on the air and restore the receiver when transmitter is off. Insert the octal plug in the control socket of the transmitter. The key on the octal plug must mate with the keyway in the large center hole of the socket. Do Not Force-be sure the key and the keyway are mated.

Connect your antenna to the socket on the rear of the transmitter marked "ANT". Connect a short piece of coax between the antenna input socket on the receiver and the "REC" socket on the transmitter using the small coaxial connector supplied with the transmitter.

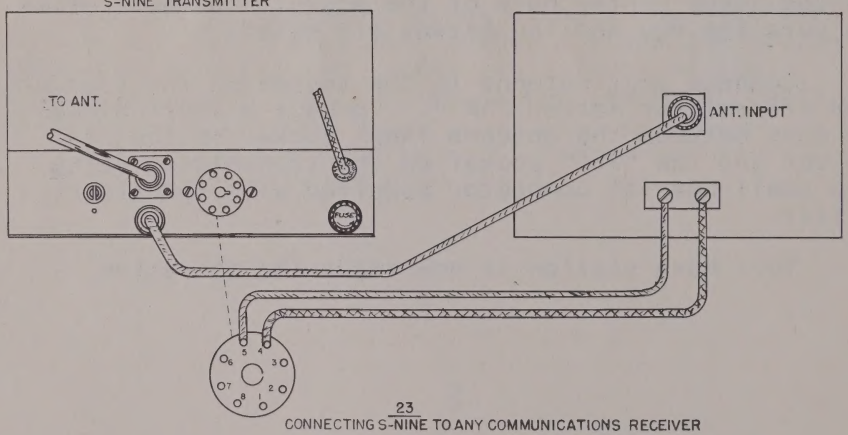
Your base station is now ready for operation.





23
CONNECTING S-NINE TO R-2700

FIG. 1



23
CONNECTING S-NINE TO ANY COMMUNICATIONS RECEIVER

FIG. 2

OPERATING THE 23/S-NINE

NORMAL OPERATION

Set the switches as follows:

Power switch - ON, Channel Selector Switch - any position that has a crystal installed. Now press the push-to-talk switch on the microphone and you are on the air. Be sure to announce your station call numbers any time you turn on the transmitter even for just short tests. Press the top part of the push-to-talk switch to turn off the transmitter. The red on the air indicator will glow when on the air and will vary in brilliance with modulation.

SPOTTING SWITCH

The spotting switch is for determining which channel crystal is being used. Press the SPOT button and tune the manual tuning dial on the receiver until a strong signal is observed on the receiver S-meter. Positive identification of the signal can be made by releasing and pressing the button a few times and watching the S-meter to see if the meter reading drops when the button is released. This switch is useful in setting the receiver to the same channel as the transmitter. The spotting switch in effect turns on a small amount of signal without turning off the receiver.

MODULATION METER

The meter on the left side of the front panel varies directly with modulation and reads in percent. This meter will indicate low readings if the operator is too far from the microphone. The meter will normally reach about 95% on voice peaks. The meter action instantaneously follows the audio, therefore it will bounce up and down quite rapidly when the transmitter is on the air and the microphone is spoken into. These readings are obtained when meter switch is on "Modulation".

OTHER METER READINGS

Readings of relative forward power and reflected power are obtained on the same meter through the same switch.

ON THE AIR INDICATOR

The red ON THE AIR indicator is a #47 pilot light bulb. This bulb acts as a fuse for the RF section and transmitter will not function if this bulb is burned out. A common cause for burn out of this bulb is turning on the transmitter without a crystal in the circuit. Make sure the crystal selector is in the right position by first checking with the spotting switch. The bulb is accessible by removing the red lens on the front panel. Do not replace with any bulb except a #47 pilot lamp.

LIGHTNING PROTECTION

An antenna system above a structure is actually an asset as far as lightning is concerned, provided it is properly installed. Some form of lightning arrestor is needed. We recommend the "Blitz Bug" which is available from Browning at $3.95, postpaid. If lightning is going to hit in the area it is much better to have it hit your antenna and run directly to ground than hit some other part of your home with the tragic results often accompanying same.

SERVICE NOTES

The Browning 23/S-NINE transmitter has been designed to give trouble free performance for many years. Although the tubes will normally have a long life they should be checked first, should trouble develop. The tube tester does not always show up a bad tube, therefore, substitution of a known good tube is the best method for locating bad tubes. If all tubes check good and trouble still persists refer to a qualified technician for repairing and testing. DO NOT TAMPER WITH ANY OF THE INTERNAL ADJUSTMENTS ON THE 23/S-NINE. TO DO SO WILL RESULT IN IMPROPER OPERATION. Only a qualified technician with the proper test instruments should service and tune the 23/S-NINE. Trouble-shooting by inexperienced persons should be limited to fuse, tube, and pilot light replacement.

Specifications subject to change without notice.

MATCHING THE 23/S-NINE TO YOUR ANTENNA SYSTEM

The Federal Communications Commission allows the adjustments of a citizens band transmitter's antenna loading system providing it does not in any way alter the frequency thereof. The following instructions will not alter the frequency of transmission, therefore, can be done by anyone:

The 23/S-NINE is the first transmitter to have A S W R (Standing Wave Ratio) Indicator built into the unit. We have intentionally delayed mentioning this very important feature because the 23/S-NINE is delivered tuned and ready to operate into a 52 Ohm Antenna System. If your system is a 52 Ohm load for the transmitter, you are ready to operate without any further adjustment. DO NOT ADJUST TRANSMITTER UNTIL AFTER YOU HAVE HAD IT ON THE AIR AND ARE FAMILIAR WITH IT'S OPERATION.

It is recommended that the first adjustments be made with the "Dummy Load" (furnished) attached in place of the antenna. This keeps your signal off the air and reduces interference and keeps you "legal" while becoming familiar with the tuning methods involved.

* It should be noted here that the meter adjust control has absolutely no effect on the output of the transmitter nor will it affect the reading of the meter when the meter is switched to "Modulation" position. The sole function of this control is to assist in Antenna Loading as explained later.

Read at least twice before proceeding with ACTUAL ADJUSTMENTS TO THOROUGHLY UNDERSTAND WHAT YOU ARE TO DO.

1. Install "Dummy Load" to antenna connector on rear of chassis.
2. Set Meter Switch on "Forward Power".
3. Selector Switch in middle area, ie. Channel 10, 11 or 12.
4. Turn on transmitter and let it warm up at least one minute.

5. Push the push-to-talk switch on microphone and adjust meter sensitivity control to exactly 40. Do not change this setting again until told to do so in Step 7.

6. With a small screw driver inserted in the opening on the right side of cabinet and nearest the front panel, very, very carefully adjust the plate tuning condenser for the highest reading on meter obtainable. Do not adjust the meter sensitivity control. These adjustments are very critical and the slightest movement, even 1/16", makes a big difference in output. Now do the same to the antenna loading condenser just to the rear again seeking maximum output reading and working very, very CAREFULLY. These steps should be repeated at least three (3) times as there is an interaction between these two controls. Always adjust antenna loading last. After making the adjustments once take transmitter "off the air" with mike switch and wait about one minute to give Dummy load a chance to cool off. FAILURE TO DO SO MAY RESULT IN BURNING OUT THE DUMMY LOAD. It is most likely that you will not be able to increase the readings the first time as this adjustment has been made at the factory. There will be a setting on both adjustments beyond which you cannot increase your output reading. This is where your transmitter is working at the absolute maximum output for a 50 - 52 Ohm resistive load. DO NOT MAKE ANY FURTHER ADJUSTMENTS TO THE LOADING CONDENSERS.

7. Adjust the meter sensitivity control for a reading of exactly 100. Do not adjust again until told to do so. Now switch to Reflected Power and make notation of lowest reading on meter. IT may not be ZERO. DO NOT be concerned if it is not. Make a pencil notation for future reference. Take transmitter off the air and replace the dummy load with the antenna cable which should be RG8U or or RG58U. Again switch to forward power, put transmitter on the air announcing your call letters. Set meter sensitivity control to reading of 100 again and shut off transmitter. You now have your transmitter adjusted to maximum output into a 50-52 Ohm antenna. Nothing you can do at the transmitter will get you any more power into the antenna and no further adjustments should be made.

8. For maximum output into the ether your antenna itself must match your antenna coaxial feedline and the 23/S-NINE is the only transmitter that will help you do that. Switch to "Reflected Power." Put transmitter on the air and note meter reading. Any increase in meter reading from reflected reading found and noted in Step 7 will indicate a mismatch between your antenna and the coaxial cable. A slight mismatch is tolerable and will not affect your transmission to any noticeable extent. A mismatch between antenna and transmission line causes some power to be reflected back from the antenna instead of being radiated into the ether. These are known as standing waves and waste part of your power. To find out how much power is being wasted refer to the Formula below:

$$\frac{If + Ir}{If - Ir} = \text{S. W. R.}$$

Standing Wave Ratio

If = DIFFERENCE between minimum and maximum - found in Step 7

Ir - DIFFERENCE between minimum found in Step 7 and minimum found in Step 8

Suppose we had a minimum reading of 10 in Step 7, the maximum was 100 and the difference therefore is 90, thus If becomes 90. With the antenna connected the minimum reading is 20, therefore, the difference between minimum readings in Step 7 and minimum readings in Step 8, is 10 and Ir is 10. By formula -

$$\frac{90 + 10}{90 - 10} = \frac{100}{80} = 1.25$$

Which means that the S W R is 1.25 to 1 and very acceptable. Any S W R less than 2 to 1 is good and anything less than 3 to 1 is not worth the trouble necessary to correct. For methods of reducing the Standing Wave Ratio, with the many types of specially constructed antennas available you will have to consult Antenna Handbooks such as published by the American Radio Relay League, West Hartford, Conn., or get the information from the manufacturer of your particular antenna. By following whatever methods recommended for matching your particular antenna to your transmission line the indication of reflected power found in your 23/S-NINE eliminates your purchasing expensive S W R meters. Practically all commercial made antennas are designed to match 52 ohm co-ax line.

SERVICING INSTRUCTIONS

The following operations according to law can only be performed by a person holding a Second Class Commercial Radio Telephone License, or a license of a higher rating. Adjustments by an unauthorized person automatically voids our warranty.

PRELIMINARY ADJUSTMENTS

A. Dummy load of 50 - 52 ohms.
B. AC switch on.
C. Make sure crystals are in proper sockets.

OSCILLATOR AND BUFFER TUNING

A. Hang VTVM on Pin 2 (grid of V4) 6EA8.
Tune L3 (oscillator) for - 6VDC.
B. Hang VTVM on pin 9 of V5 (5763).
Tune L4 to peak - Volts on VTVM Neg. DC.

FINAL TUNING

Meter switch on forward power position.

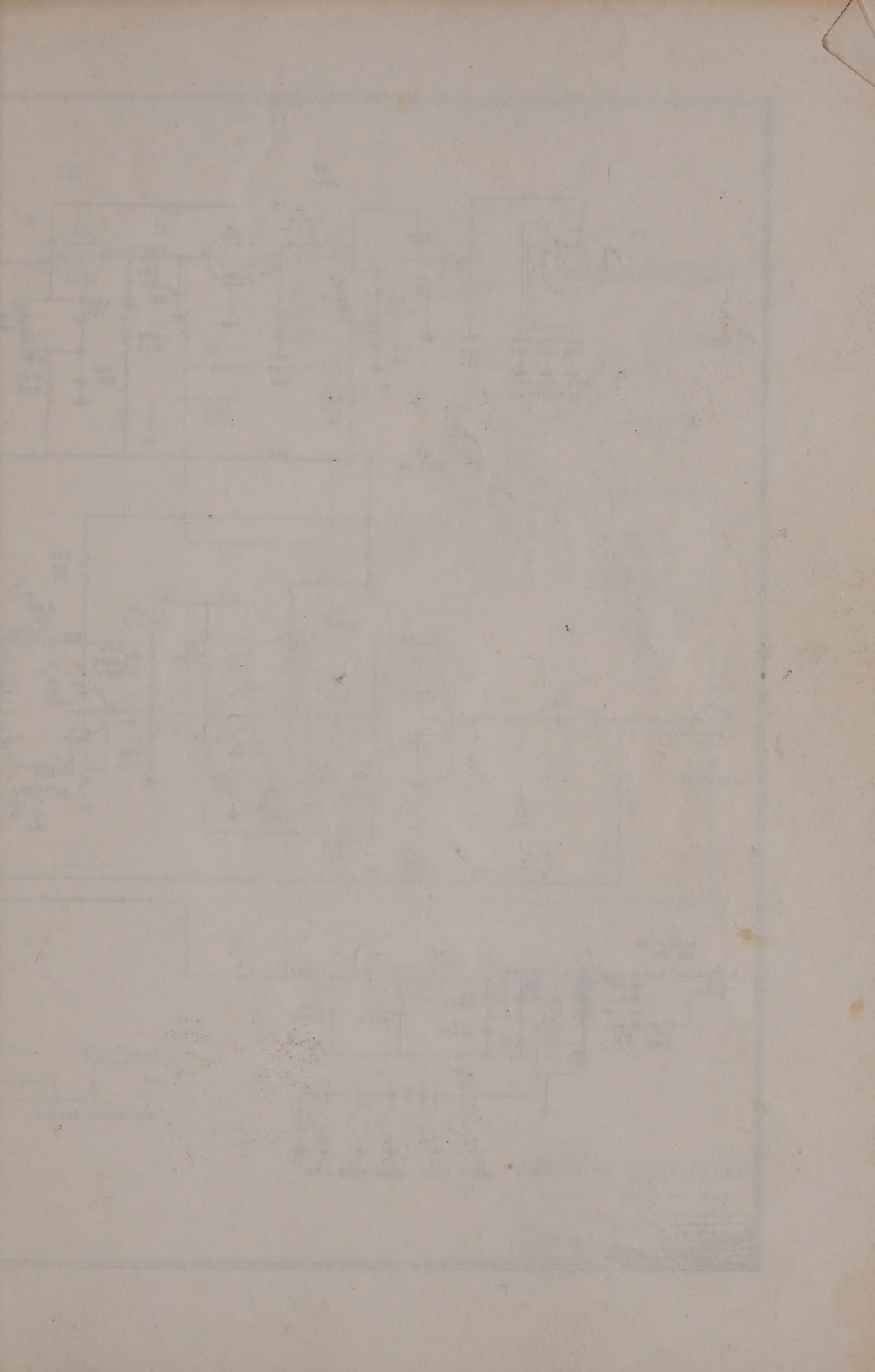
A. Use three crystals - High, Low and Middle of band.
B. Start with middle of band crystal. Tune C27 (plate tuning) and C28 (Antenna Tuning) repeat several times on both because of interaction for maximum power output.
C. Check low and high crystals at this time. If the output at one end of the band is lower than the other tune the plate tuning C27 to favor the lower output, now switch to middle of band and retune the antenna C28 to the middle of the band. Repeat these steps until the ends are equal in power. The final adjustment should always be the antenna in the middle of the band. Now carefully retune the Buffer (L4) Coil.

SYSTEMS CHECK

Plug 23/S-NINE with two interconnecting cables into Receiver and check for no loss in receiver rush.

Increase Mod. pot R10 to maximum clockwise position and back off 1/4 turn. Check for proper amount of audio on oscilloscope or by talking with some one on the air.

Check for spot frequency operation by pushing spot switch and selecting different crystals. In tuning the oscillator and buffer coils it is important to use the proper plastic hex drive. If a screwdriver is used the cores will be cracked and permanent damage will result to the coils.



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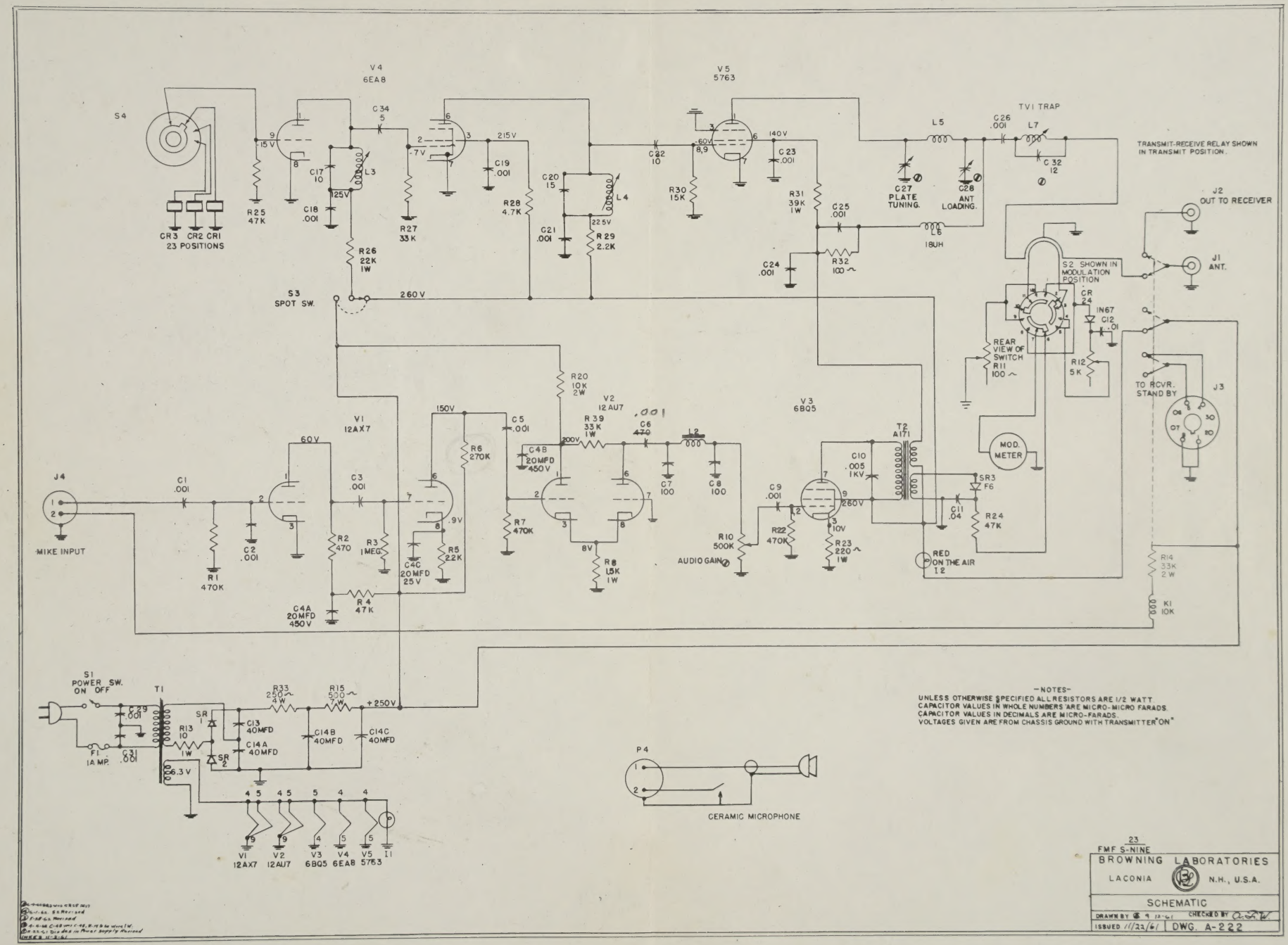


-NOTES-

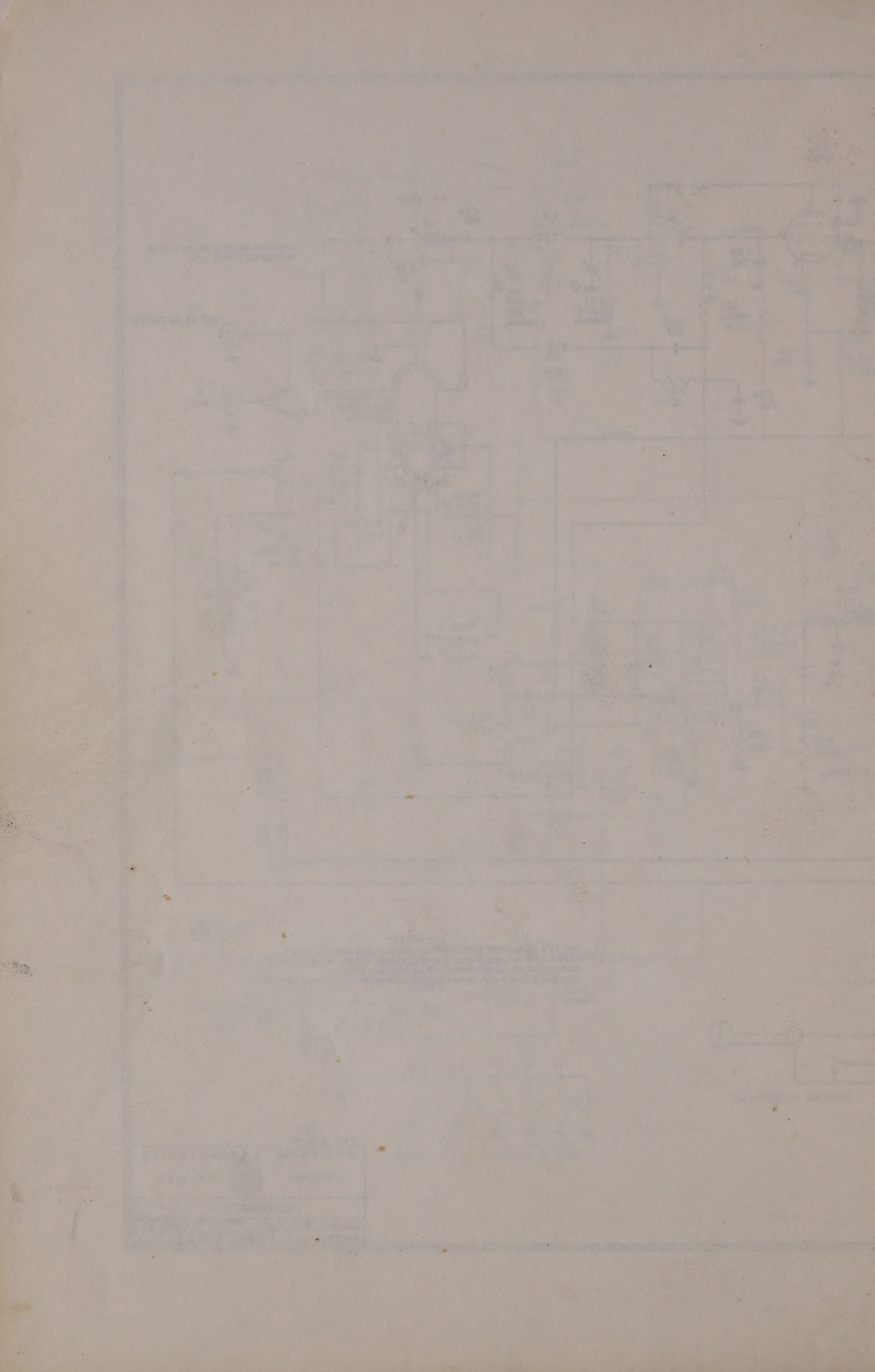
UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/2 WATT.
CAPACITOR VALUES IN WHOLE NUMBERS ARE MICRO-MICRO FARADS.
CAPACITOR VALUES IN DECIMALS ARE MICRO-FARADS.
VOLTAGES GIVEN ARE FROM CHASSIS GROUND WITH TRANSMITTER "ON"

23
FMF S-NINE

BROWNING LABORATORIES
LACONIA N.H., U.S.A.

SCHEMATIC

DRAWN BY [illegible] CHECKED BY [illegible]
ISSUED 1/1/23/61 DWG. A-222



Control R11 is used for obtaining the deepest null when reading reflected power with a Dummy load fastened to the output of the transmitter.

Proceed as follows:

Adjust Potentiometer R11 for lowest reading against the Dummy load supplied, or a non-inductive load of 50 - 52 Ohms across the coaxial output connector of the transmitter.

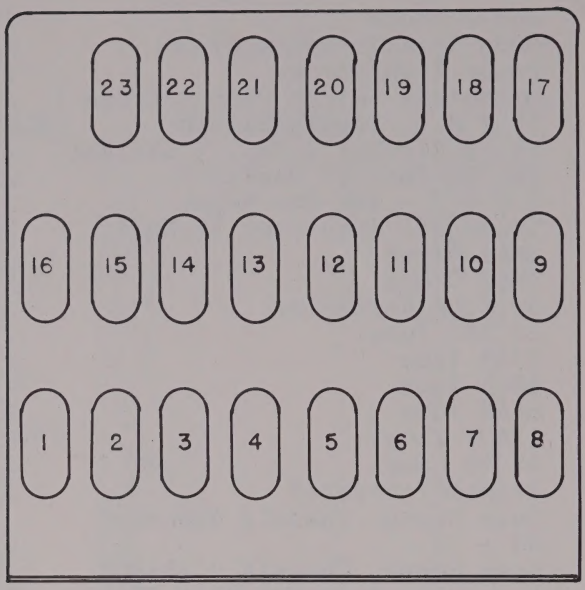
This may not read zero. In every case, however, adjust for the lowest reading obtainable with power on, meter switch in reflected power position.

S - N I N E

PARTS LIST

Schematic No.	Description	Part No.
R13	10 Ohm C. Resistor 1W 10%	23 - 1
R32	100 " " " ½W "	23 - 2
R23	220 " " " 1W "	23 - 3
R5 - R29	2200 " " " ½W "	23 - 4
R37	10 K " " " " "	23 - 5
R30	15 K " " " " "	23 - 6
R28	18 K " " " " "	23 - 7
R27	33 K " " " " "	23 - 8
R24-R25-R4	47 K " " " " "	23 - 9
R6- R1	270 K " " " " "	23 - 10
R2-R7-R22-R35	470 K " " " " "	23 - 11
R3	1 Meg " " " " "	23 - 12
R8	1.5 K " " " 1W "	23 - 14
R20	10 K " " " " "	23 - 15
R26	22K " " " " "	23 - 16
R14 - R39	33K " " " " "	23 - 17
R31	39K " " " " "	23 - 18
R16	250 Ohms Wire Wound 4W "	23 - 19
L1	6 hy Filter Choke	23 - 20
R12	5 K Pot. Linear ½W Carbon ½"Shaft	23 - 21
R10	500 K Pot. " ½W " S.D. "	23 - 22
R11	100 Ohm " ½W " " "	23 - 23
C34	5 mmf Dip Mica Cap 10% 500 V	23 - 24
C17 - C22	10 " " " " " "	23 - 25
C32	12 " " " " " "	23 - 26
C20	15 " " " " " "	23 - 27
C7 - C8	100" " " " " "	23 - 28
C23	220 mmf Disc. Cer. Cap "	23 - 29
C1- 2 - 3 -5	.001 mfd " " " "	23 - 30
9 - - 18		
19- 21 - 24		
25- 26 -29-31		
C10	.005 mfd Disc. Cer. Cap 500V	23 - 31
C12	.01 " " " " "	23 - 32
C11	.04 " " " " "	23 - 33
C13	40 mfd Tub. Elec. 250V	23 - 34
C4=A-B	20/450 20/450 Tub. Elec.	23 - 35
C14-A-B-C	40-40-40 Can Type Elec.All@450V	23 - 36
C28	Mica Padder-100-500 mmf	23 - 37
C27	APC 25 mmf Var. Cap.	23 - 38
C6	470 mmf Dip Mica 10% 500V	23 - 39
C4C	25 mfd 25V	23 - 40
L6	18 uh Choke	23 - 41
L3 - L4	1 uh Coil	23 - 42
L7	TVI Trap	23 - 43
L5	Pi Net Coil 1.4 UH 9Turn 3/4" D	23 - 44

Schematic No.	Description	Part No.
L2	Audio Choke	23 - 45
T2	Mod. Transformer A171	23 - 46
T1	Power Transformer	23 - 47
S3	Momentary Switch Open 1 Close 1	23 - 48
S1	SPST A.C. Toggle Switch	23 - 49
S2	SW.-3 Circuit 3 Pos. 1 Sec.Rot.	23 - 50
S4	SW. 23 Pos. $\frac{1}{2}$" Shaft	23 - 51
K1	3 P D T - 10K Ohm Relay	23 - 52
	Stand Off Insulator (PiNet)	23 - 53
CR 24	1N67 Diode	23 - 54
CR 25	1N67 Diode	23 - 55
SR1 - SR2	Silicon Rectifier	23 - 56
V1	12 AX7 Tube	23 - 57
V5	5763 Tube	23 - 58
V3	6BQ5 Tube	23 - 59
V4	6EA8 Tube	23 - 60
V2	12AU7 Tube	23 - 61
I2 - I1	GE 47 Lamp	23 - 62
CR1	Transmit Crystal	23 - 69
J1	Coax Recep. Chassis Amphenol 83 - 1R	23 - 70
J2	Coax Recep. Chassis " 31-002	23 - 71
P1	Coax Plug Amphenol 83-1 SP	23 - 72
P2	Coax Plug " 31-102	23 - 73
J3 - P3	Octal Plug	23 - 74
	Octal Socket	23 - 75
M1	0-1 MA Meter	23 - 76
F1	2 Amp Fuse	23 - 77
FH1	Fuse Holder	23 - 78
	9 Pin Bakelite Socket	23 - 79
	Cer. Crystal Socket	23 - 80
	Pilot Light Socket	23 - 81
	Meter Light Socket	23 - 82
LC1	Line Cord (AC)	23 - 87
MC1	Microphone - Push to talk SW.	23 - 88
	Leg Spacers A 161	23 - 89
	Rubber Feet	23 - 90
	Knob - 180° Scribe A 166 - 3	23 - 91
	Knob Plain A 166	23 - 92
	Strain Relief Bushing	23 - 93
J4	Mic. Socket Amphenol 80 PC-2F	23 - 94
P4	Mic. Plug Amphenol 80 MC-2M	23 - 95
	Shaft Coupling 1/4" x 3/4"	23 - 96
	Panel Bushing 1/4" x 3/8"	23 - 97
	1/4" Fibre Shaft $5\frac{1}{4}$" Long	23 - 98
	S.W.R. Can Browning	23 - 99
	Switch Bracket A 221	23 - 100
	Pi Net " A 198	23 - 101
	Trim Plate A 218	23 - 102
	Front Panel A 217	23 - 103
	Top Cover A 175	23 - 104
	Chassis A 220	23 - 105
	Bottom Plate A 219	23 - 106
	Crystal Bracket A 214	23 - 107
	Dummy Load	23 - 108



CRYSTAL LOCATIONS IN S-NINE

Location of crystals looking from the rear of the transmitter towards the front panel, are as shown on the above diagram.

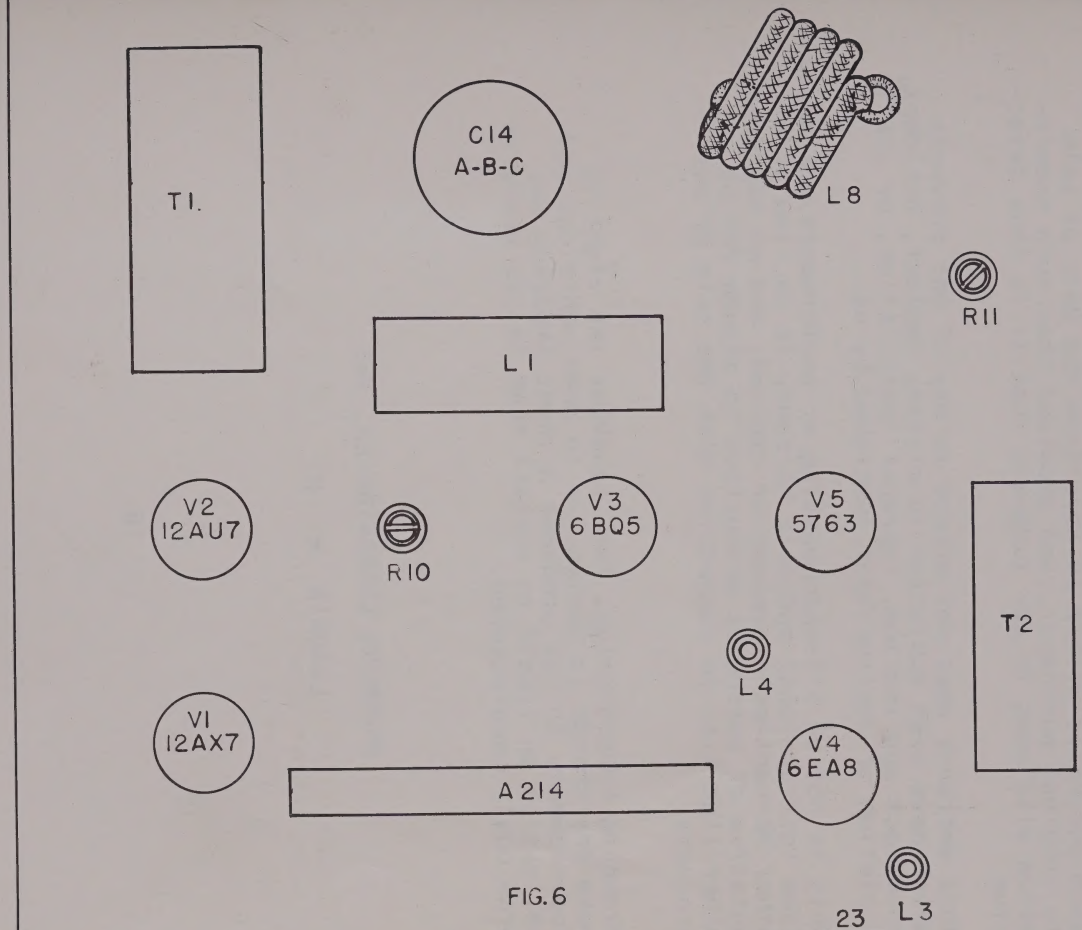


FIG. 6

PARTS LOCATION DIAGRAM MODEL S-NINE

BROWNING LABORATORIES INC.
LACONIA, N.H. U.S.A.

WARRANTY

Browning Laboratories, Inc., warrants each new intercommunicating device manufactured by it to be free from defective material and workmanship and agrees to remedy such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect - provided the unit is delivered by the owner to us or to our authorized distributor or dealer from whom purchased within 90 days from the date of sale to original purchaser, and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect application, improper installation, or use in violation of instructions furnished by us.

This is not an all-encompassing or performance guarantee (see instructions) and this Warranty is in lieu of all other Warranties expressed or implied; and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

Browning Laboratories, Inc. reserves the right to make any change in design, or to make additions and improvements in its products without imposing any obligation on itself to install them in its products previously manufactured.

BROWNING LABORATORIES, INC.

LACONIA, N. H.

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AND TRANSMITTERS